Space Weather Forecast

Issued on Tuesday, 25 January 2022 at 00:44 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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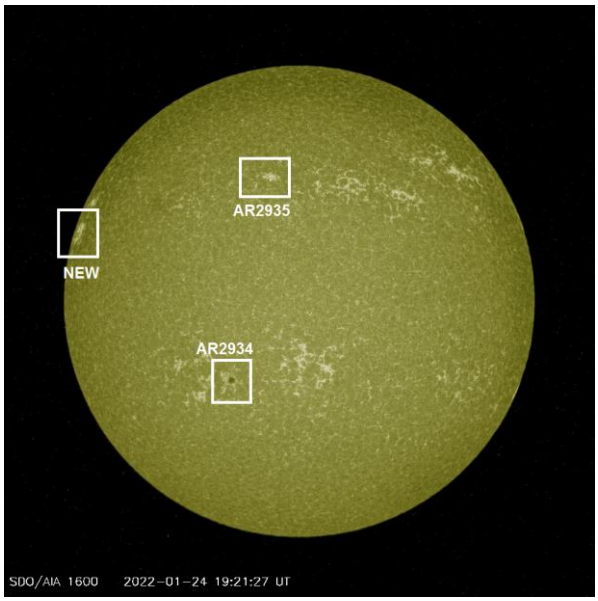
Space Weather Forecast Headline: Small but sustained likelihood of G1 Minor Geomagnetic storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low in the past 24 hours, with a small common-class X-ray flare observed at 24/0237UTC from a new sunspot region that has recently rotated over the northeastern solar horizon. This is one of up to three sunspot regions on the current facing side, adding to the long-term resident and inactive unipolar region, and another small bipolar group which developed in the northern solar hemisphere near the solar meridian.

No Earth-directed Coronal Mass Ejections (CMEs) were observed in available imagery.

Figure 1: False colour near UV image from 24/1900UTC, showing sunspot regions on the Earth-facing side and their surrounds – termed 'plages'. The region labelled 'NEW' is likely to reveal further detail in the coming hours.



Solar Wind / Geomagnetic Activity: The solar wind initially typified a slow solar wind regime, but there were increasingly signs of enhancement as the period went on. The cause of this is uncertain, however it is perhaps most likely to be a Co-rotating Interacting Region (CIR - a compression front with greater density than the ambient wind) ahead of an expected 'coronal hole' fast wind (a rarefaction).

Accordingly, the solar wind density rose significantly through the UTC day, eventually falling back a little into the UTC evening. The magnetic field associated with the particles in the solar

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wind also showed a rise, from background levels to become slightly elevated in the final hours of the period. The solar wind speed itself was less noteworthy, remaining at background levels throughout in the absence of the coronal hole proper.

The result of the above solar wind measures was for provisionally quiet geomagnetic activity throughout the 24 hours, well below G1 Minor Geomagnetic storm.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to remain low, with up to three small and simple sunspots on the Earth-facing side of the sun, giving a daily 25% chance of further common-class X-ray flares.

Solar Wind / Geomagnetic Activity: There are up to three glancing CME arrivals possible in the forecast period through to and including midweek UTC, although two of these are now overdue and may have passed the radius of Earth's orbit to no effect. The fast wind of a coronal hole is also expected to arrive, most probably on day one (Tuesday 25 January) but with some notable uncertainty.

Until the arrival of this fast wind or any CMEs, background slow wind conditions will ensure quiet geomagnetic activity. Any enhancements will bring a chance of G1/Minor Geomagnetic storms. At the end of the four days, a second coronal hole fast wind may arrive, giving a further peak slight chance of G1.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	20	5	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	1	1	1	1
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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